

The write up was originally posted on the PWCtoday forum after a similar document with the same information was sent directly to SBT. SBT's response appeared to be a form letter that did not address any of the issues with the engine. I have given this document to a friend who requested it after the original was deleted from the PWC forum. I guess the truth hurts sometimes!!!

Larger, more clear photos are included on a separate document.

History;

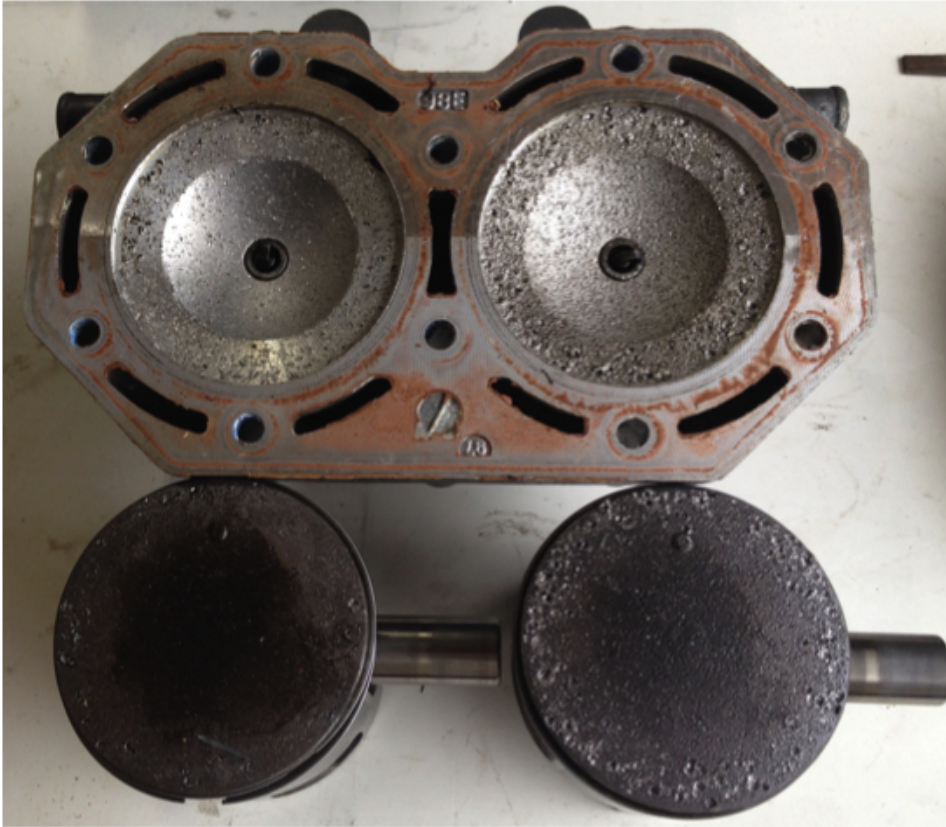
I purchased a TigerShark 770 rebuilt engine from SBT in June 2014. I did not get it installed until May 2015. It ran fine. I burned about 5 gallons of fuel in 2015. In 2016 it burned about 6 gallons before it broke. I always drain the tank for winter, using the fuel in my old tractor, and put fresh 93 octane fuel premixed at 40:1 in the boat.

The Breakdown;

While cruising using just enough throttle to stay on plane, the boat suddenly shuddered and the engine stalled. I thought maybe I had sucked up a stick or something. The engine would not turn over when I first tried to restart. After a few attempts and a couple of prayers, I was able to restart and to ride on. Heading back to the dock, things seemed ok until the engine shuttered again, then ran on only one cylinder. There was no one else around so I was not able to get a tow. I headed to shore and had to hug the shoreline back to the dock to limit the distance I would have to swim in the event it stopped completely.

The engine now out of warranty I began to investigate back in my shop. I discovered a damaged MAG side spark plug. Removing the head revealed significant damage to the MAG side piston, head and plug. Damage of similar pattern but much less severe in the PTO side cylinder.

Photo #1

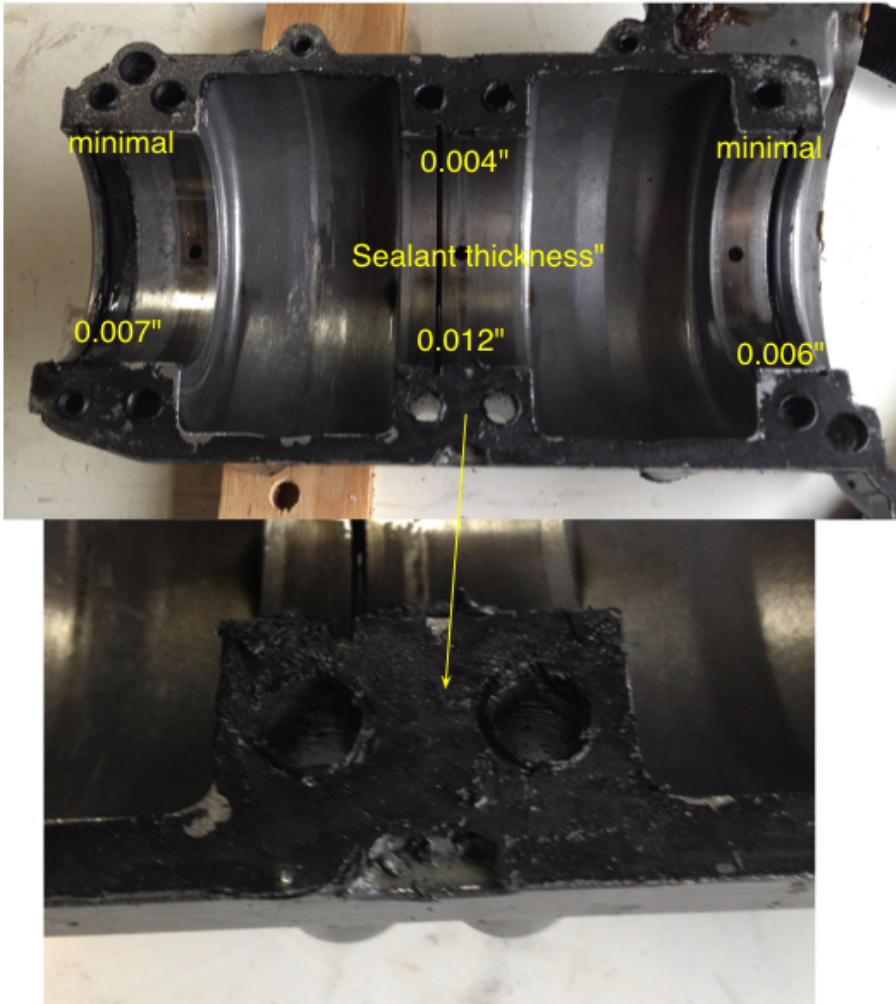


Close inspection of the damage suggests that something odd shaped was ingested. Other dents suggest something round and hard, like a bearing needle was ingested. I was however puzzled how this would damage both cylinders.

I removed and fully disassembled the engine. What I have discovered should be of great concern to anyone purchasing an SBT engine.

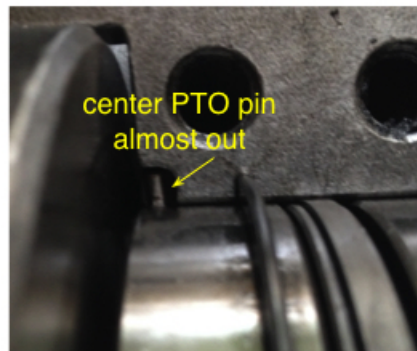
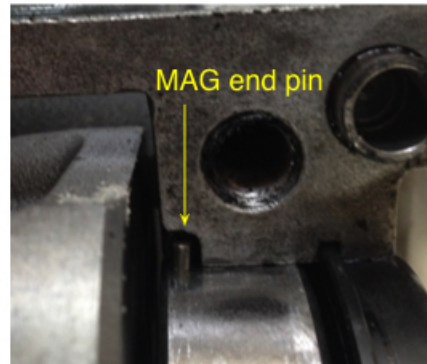
The first notable issue is the huge amount of sealant between the crankcase halves. The Tigershark service manual states, "**Apply a LIGHT COAT of Artic-Cat High-Temp Sealant to the bottom crankcase half.**" As the halves are assembled and torqued properly almost all of this LIGHT COAT should be squished out, remaining in minute imperfections, creating a tight, dimensionally accurate crankcase. The sealant remaining in the seam on this engine is totally unacceptable. One has to question how could this much REMAIN between properly torqued case halves. The sealant at the center bearing is 0.012" thick. Tapering to 0.007" at the PTO end and to 0.006 at the MAG end.

Photo #2



Further inspection revealed the cause of the cylinder/piston/head damage. There are 4 locating pins, one in each bearing. These pins keep the steel bearing race from rotating in the aluminum case. TWO of these pins are missing. One of the two remaining pins was almost out of the hole that is supposed to hold it in place.

Photo #3



Further inspection shows damage to the crankcase where these pins fell out and were dragged between crankcase and the crankshaft, gouging aluminum from the case.

This explains both kinds of piston/head damage. The pins caused the perfectly round dents. The aluminum gouged from the crankcase explains the randomly shaped damage. I have to assume the PTO pin was the first to come out as the crankcase damage is more severe and there is much less piston damage. It appears this pin stalled the engine when the crank caught it. On restart, the pin went through the cylinder quickly and did not damage the spark plug. This also explains why the engine was reluctant to turn over when I first tried to restart. The MAG side pin came out next. Running at higher speed it went quickly through the crankcase, but stayed in the cylinder longer, damaging the plug.

“Why did the engine fail?” evolved into two questions... 1) Why was the sealant so thick? And, 2) Why did the pins come out?

This is what I have discovered:

1) The center bearing on the PTO side is the thrust bearing for this engine. A groove in the bearing matches a groove in the crankcase. The Service Manual states; ***“Install the C-ring ... into the upper crankcase half”***. The bearing on the engine SBT assembled has a full ring on the bearing. This might have been an acceptable change, perhaps even an improvement over the C-ring. HOWEVER, the ring they installed stands from 0.130” to 0.137” above the bearing. The groove it is intended to fit into is only 0.125” to 0.130” deep. This is why the sealant was so thick between the case halves. The ring prevents the halves from pulling tightly together.

Photo #5

Crankcase Groove depth 0.127 at this location.
Range 0.125" to 0.130"



Bearing ring height 0.136 at this location.
Range 0.130" to 0.137"



2) The excessive gap between the crankcase halves prevented the bearings from being held securely as they need to be in order to remain stable under load. The flexing and vibration, caused by the crank flexing due to the bearings

being loose in the case, caused the pins to work their way out of the bearings, and to damage the pistons, head and cylinders.

Has anyone else had issues with SBT's "**high quality remanufactured engines**"?

I sent them all of this information in private so they could respond, and perhaps learn from the error. The response was not at all what I had expected. They blamed the failure a list of possible factors including: lack of lubrication, improper winterizing, etc.

Buyer Beware,

John